Paper Code: CH-303	Roll No.										

B. TECH
(SEM. III) THEORY EXAMINATION, 2016-17
MECHANICAL OPERATIONS

[Time: 2 Hours]   **[Total Marks: 50]**

Note: **(1) Attempt all questions.**
  (2) All questions carry equal marks.
  (3) In case of numerical problems assume data wherever not provided.

1.   Attempt any **TWO** parts of the following:-   (5x2=10)

  (a)   Give the Classification of unit operations. Also discuss the roll of unit operations in the chemical process industries.

  (b)   Differentiate between Rittinger's law and Kick's law with the help of suitable examples.

  (c)   What are the continuous weighing techniques? Also compare blending and kneading.

2.   Attempt any **TWO** parts of the following:-   (5x2=10)

  (a)   What should be the diameter of a set of rolls to take feed of size equivalent to 38 mm spheres and crushed to 12.7 mm, if the coefficient of friction is 0.35?

  (b)   Draw a neat diagram of Rotary drum filter and explain its working principle.

  (c)   What is cake resistance? Give the classification process of filters for separation of solid from suspension.

3.   Attempt any **TWO** parts of the following:-   (5x2=10)

  (a)   Draw neat diagram of 'Blake Jaw Crusher' and explain its working principle.

  (b)   Calculate the energy required to crush 100 tonne/hour of $CaCO_3$ If 80% of feed passes through a screen 3.75 cm. aperture and 80% of the product passes through a screen with 0.03 cm aperture. The work index for $CaCO_3$ is 12.74, when the capacity is expressed in tonnes/hour, energy required in HP and size of feed and product in feet.

  (c)   Define the term 'Entrainment' and also differentiate between the Floatation and Elutriation.

4.   Attempt any **TWO** parts of the following:-   (5x2=10)

  (a)   Draw neat diagram of 'Hydraulic Jig' and explain its working principle.

(b) A crusher crushes rock having a volume surface mean diameter of 0.2 m and discharges product of volume- surface means diameter of 0.04 m. To crush 3.5 kg/sec, 7 kW of power is required. Using Rittinger's law, calculate Rittinger's constant K_R.

(c) Give the classification of conveyors. Explain the working of belt conveyor with neat diagram.

5. Attempt any **TWO** parts of the following:- (**5x2=10**)

(a) A rotary filter, operating at 2 rpm, filters 1000 lits/min. operating under the same vacuum and neglecting the resistance of the filter cloth at what speed must the filter be operated to give a filtration rate of 2000 lits/min.?

(b) Define the term 'Minimum Fluidization velocity'. Also discuss terminal velocity of particles

(c) Explain the following:
  (i) *Electrostatic separation*
  (ii) *Decantation*